

ON SOME BORNEAN FIG-INSECTS (AGAONIDAE  
—HYMENOPTERA CHALCIDOIDEA).

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The following notes deal with the AGAONIDAE represented in a small collection of fig insects formed in 1907-8, in Sarawak, by Mr. J. Hewitt, now Director of the Albany Museum, Grahamstown, South Africa.

Genus **Blastophaga**, Grav.

**Blastophaga jacobsoni**, Grnd.

*Blastophaga jacobsoni*, Grandi, Boll. Lab. Zool. Portici, x, pp. 126 and 127, 26th April 1916, and *ibid.* xii, pp. 21-32, figs. vii-x, 1917.

Four ♀♀ "From a fig."

BORNEO: Siol, Sarawak, viii. 1908 (*J. Hewitt*).

In none of these specimens is the antenna complete beyond the sixth joint. Dr. Grandi, who has at my request kindly compared this material with the type (which was described from fruit of *Ficus procera*, Reinw., var. *crassiramea*, King, from plants in the Botanical Garden, Buitenzorg, Java), is satisfied that it is referable to his species, although the first mid-tarsal is not longer than the second, and the pilosity of the thorax is not quite typical.

The range of *Ficus procera* and its var., so far as I can ascertain, is Java and Sumatra. The species may, however, have been introduced into Borneo.

Genus **Ceratosolen**, Mayr.

**Ceratosolen hewitti**, sp. nov.

♀.—Head wider (10:9) than long (deep). Clypeal lobes large and very prominent (fig. 1, *a*), central tooth short, keel distinct. Distance between the lower corner of the eye and the base of the mandible slightly longer than the depth of the eye. Antenna, length 0.9 mm. (fig. 1, *b*); the scape viewed from beneath (fig. 1, *c*) and outwardly shows a remarkable obliquely-set thickish edge or ridge ending abruptly at both extremities; process of the third joint (fig. 1, *b*, *d*) distinctly articulated, fourth joint short; sensoria of the funicle numerous, only shortly free distally, those on the inner aspect of the fifth joint being slightly broader than any others; spinose bristles on the inner surface of the pedicel (fig. 1 *d*) numerous and stout.

Trophi. Mandible with two small teeth and swollen along the anterior edge; its ventral surface with about five ridges. Appendage (2:1) short and broad, three-fourths as long as the mandible itself and half as broad, with five ridges. Stipes with one lateral bristle and no free splint.

Thorax. Protergum broadly concave posteriorly; free striated margin broad, narrower at the extremities; whole sclerite bristly—40 bristles, more or less, on each side of the mid line. Scutellum generally with three bristles along each furrow and 7-8 (minute) across the middle. Propodeon (fig. 1, *e*) with numerous bristles round the spiracle. Prepectus showing a number (6-8) of fine striae, antero-posteriorly directed, on the outer two-thirds. Mainly posteriorly, the mesosternum bears numerous bristles.

Forewings twice as long as broad, length about 1.125 mm. Submarginal: marginal: radius: postmarginal veins approximately in ratio 33:9:11:14. The

submarginal bears towards the base a clear pustule (before which 1-2 bristles may occur) without a bristle, but followed by five moderately long bristles, all on the proximal two-thirds of the vein. At the uprise to the marginal is one somewhat long

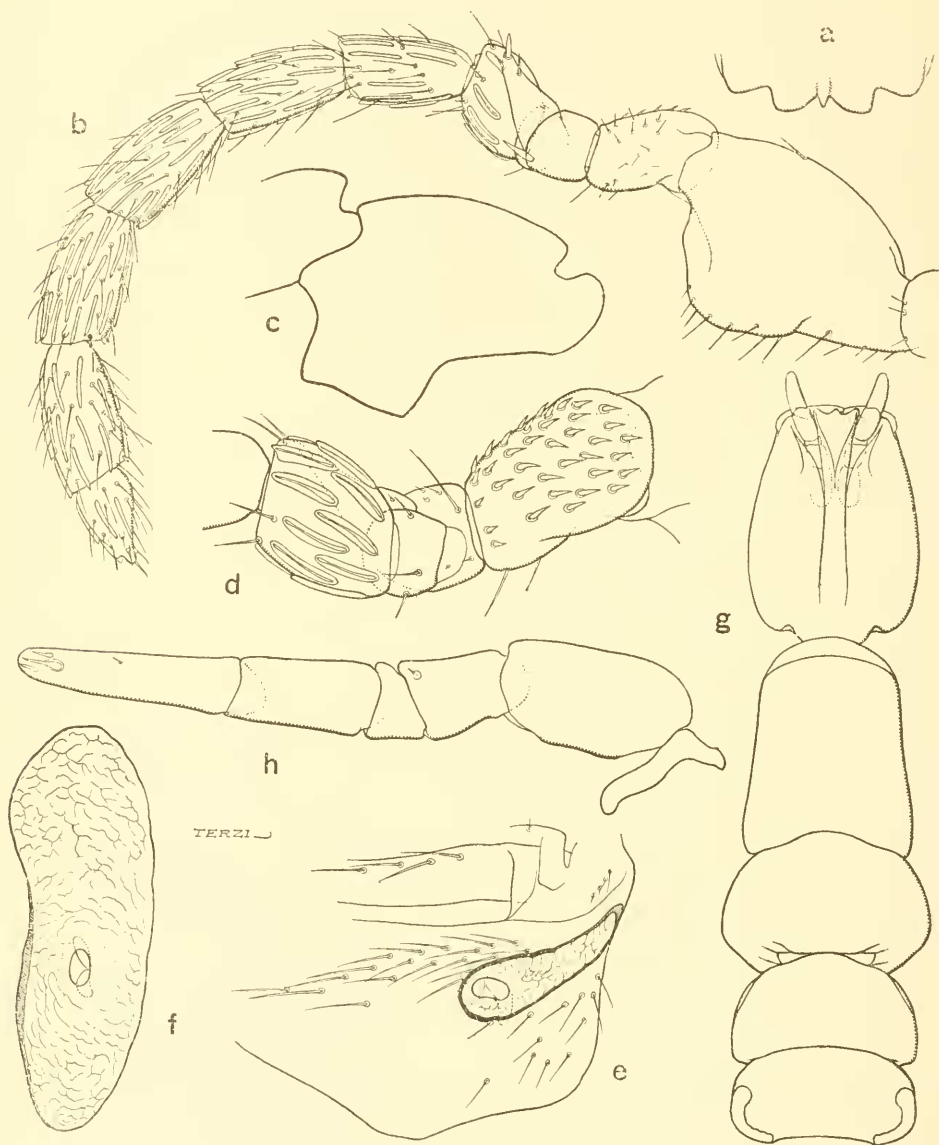


Fig. 1. *Ceratosolen hewitti*, Waterst. sp. n., ♀: a, edge of clypeus; b, antenna; c, outline of scape to show ventral lobe; d, armature of 2nd joint of antenna (pedicel), and details of joints 3 and 4; e, right half of metanotum and propodeon; f, abdominal spiracle.

*C. hewitti* ♂: g, head and thorax; h, antenna.

bristle and 3-4 clear pustules triangularly arranged. Up to the radius the marginal bears 7-8 bristles and the postmarginal 3-4; along the combined edges of marginal

and postmarginal stand about 20 bristles, some of which are double, *i.e.*, one rising from above and the other from below the membrane. Radius with 4-5 bristles and three clear pustules. Hindwing (7:2) 0.66 mm. long.

Legs. Fore coxa shorter (3:4) than femur; the latter (12:5) much longer (8:3) than the tibia, which bears four teeth (alternately long and short) at the antero-dorsal apical angle; tarsus approximately 4:2:2:2:5, the first joint with 2-3 bristles along the dorsal edge. Mid femur (4:1) longer (9:8) than coxa and trochanter combined, with four longish bristles in a median row anteriorly and 1-2 more, nearer the dorsal edge, apically; posteriorly there are 8-9 bristles, mainly on the apical two-thirds, 4-5 as on the anterior aspect being in a median row, with the others above, towards the dorsal edge. Tibia distinctly longer than femur, narrow (10:1) on proximal two-thirds of its length, then rather abruptly expanding to the apex (7:1); along the dorsal edge are about 14 bristles (of which five or six on the apical third are longer), and one or two fewer on the ventral edge; additional bristles occur distally on both faces, so that the apical third of the tibia is distinctly bristly. Tarsus longer than the tibia, its first two joints in ratio 11:7. Hind coxa externally naked, but with about a dozen short bristles on inner surface—mainly on dorsal half; femur (2:1) not much longer (10:9) than coxa; tibia (12:5) rather broad towards apex. Tarsus with first joint twice the second in length; chaetotaxy of first joint, dorsal 7-8, anterior 12-13, ventral (plantar) 10—all beyond basal third—posterior 8-9 bristles; those on anterior aspect the thinnest; second joint 3-4, 8-9, 5-6, 5; third joint 2, 6, 4, 3. The plantar spines are stout and rise from definite sockets, the plantar edge not being frayed or fimbriated.

Abdomen. Tergites entire. The first (third) tergite bears over 30 minute bristles, and the spiracle is enormous (fig. 1, *f*). Ovipositor barely projecting beyond the apex of the abdomen. The length visible varies, according to pressure and relaxation of the parts, from 0.04-0.07 mm. in a series of mounted examples. The last sternite is truncated, except for a long, narrow median projection. Stylet (8:3).

Length, 1.5-1.9 mm.; alar expanse, 2.8-3.4 mm.

♂.—Head length 0.45 mm.; length of pronotum 0.35 mm.; mesonotum length 0.23 mm., breadth 0.4 mm.; metanotum, length 0.175 mm., breadth 0.35 mm.; propodeon, length 0.175 mm., breadth 0.35 mm.

Head (fig. 1, *g*) twice as long as broad anteriorly and about one-third longer than its maximum breadth. The bristles (1, 1) set just above the median lobe of the clypeus are short—half as long as their basal distance apart. Antenna (fig. 1, *h*) with bulla about four-fifths the length of the scape (11:6); pedicel (4:3) two-thirds of the scape. Funicle (three joints) twice as long as the scape, its first joint triangular in profile; fourth joint shorter (6:7) than fifth, but both greater than the pedicel, which is only five-ninths of the fifth.

The propodeon is remarkably broad posteriorly (fig. 1, *g*).

Legs. Fore femur over twice as long as broad and more than two and one-third times the tibia (excluding the apical tooth) in length; tibia longer (10:7) than the tarsus and not equal to the greatest breadth of the femur. Mid coxa, femur, tibia, and tarsus subequal—the coxa very slightly the longest; femur very convex dorsally and subangulate at one-third from the apex; apex of tibia with two teeth at upper angle, one laterally and externally and two ventrally. Hind coxa (2:1), or with membranous flange (10:7), shorter (10:11) than femur (4:3); tibia (5:2) not quite three-quarters the length of the femur and as long as the tarsus, bearing 4-5 teeth apically—counting both sides; tarsus sparsely set with bristles, one (lateral and preapical) on joints 1-4 being longer.

Length, up to about 2 mm.

Type ♀ in the British Museum, one of a series of ♂♂ and ♀♀ from a fruiting trunk of *Ficus* sp.

BORNEO: Sarawak, vii. 1907 (*J. Hewitt*).

*C. hewitti*, sp. n., belongs to the group of which *C. striatus*, Mayr, and *C. crassitarsus*, Mayr, may be taken as representatives. It is at once known in the ♀ by the short ovipositor and the terminal segments of the funicle, while the ♂ is equally characterised by the head and propodeon.

Genus **Eupristina**, Saunders.

**Eupristina verticillata**, sp. nov.

♀.—Head wider than deep (11:10); clypeus with a fine median ridge and distinct but not prominent oral lobes, each with one bristle. The antennal grooves, above the toruli, occupy about one-third of the width of the frons. Trophi: mandibles apically bidentate, with about five ventral ridges (fig. 3, *a*), anterior edge much swollen; appendage narrow, with 8-10 ridges (fig. 3, *a*, *a*<sup>1</sup>) of which 2-3 near the articulation are strong, projecting tooth-like at the inner edge; maxillae (fig. 3, *b*) with no free splint. Antenna (fig. 2) just over 0.5 mm. long; pedicel with a number

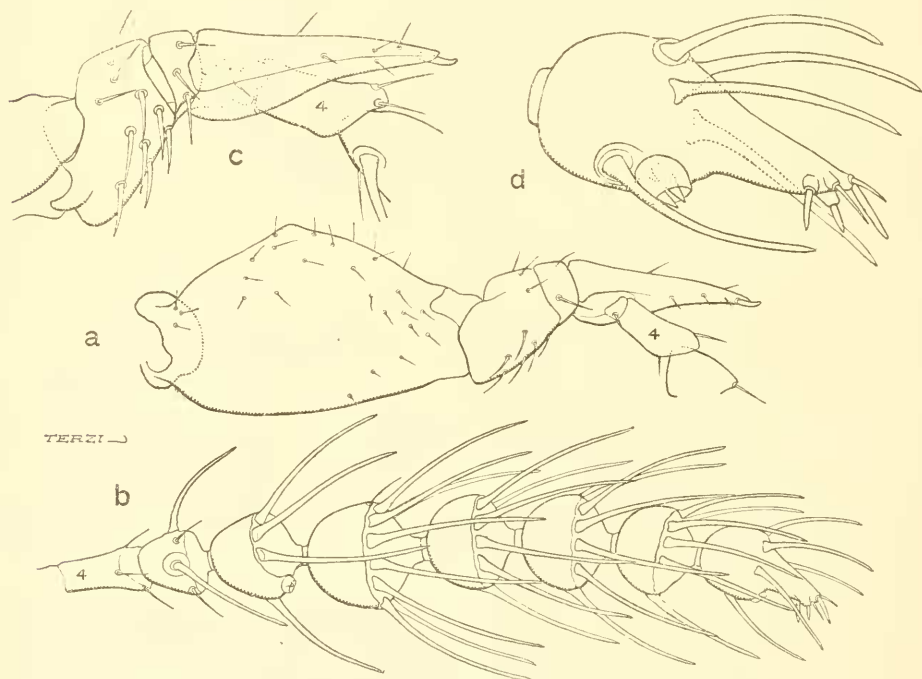


Fig. 2. *Eupristina verticillata*, Waterst., sp. n., ♀: *a*, *b*, antenna; *c*, detail of joints 2-4; *d*, apical sense-organs.

of stiff, rather fine, recurved bristles on inner dorsal aspect (fig. 2, *c*); process or appendage of third joint long, completely articulated; sense-organs on joints 5-11 long and tubular, subapical in position; besides these on the outer apical edge of the sixth joint a small cup-shaped sensorium with a short central process (fig. 2, *b*), and another much larger one on the basal half of the eleventh joint (fig. 2 *b*, *d*); at the extreme apex of the club a group of sensory spines—five in all (fig. 2, *d*).

Thorax. Pronotum entire, but with a deep concave membranous area anteriorly ; posterior edge gently and evenly concave, the free striate margin expanded abruptly at the extreme sides into a subtriangular head ; spiracle not greatly salient. Medianly and anteriorly the sclerite is bare, but at each side posteriorly towards the expansion of the striate margin are 6-7 short bristles in two rows, and about a dozen more round the spiracle. Scutum bare, except for one minute bristle on each side near the furrow at one-third before the suture. Parapsides with six bristles. Scutellum and meso-

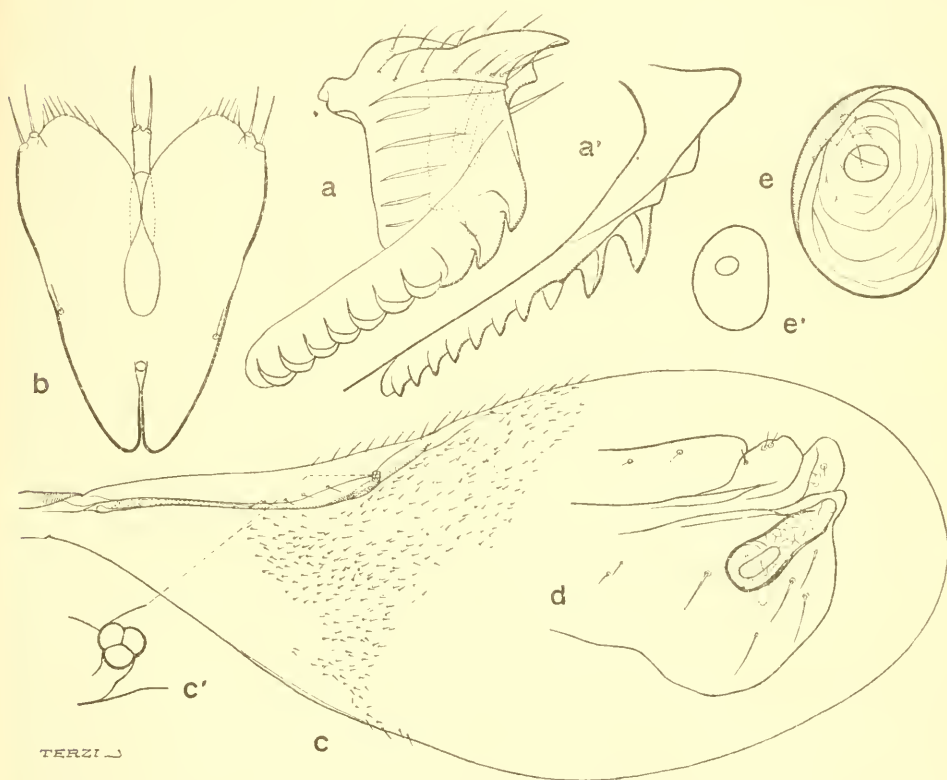


Fig. 3. *Eupristina verticillata*, Waterst., sp.n., ♀ : *a*, mandible, ventral view ; *a'*, mandible in profile ; *b*, 1st and 2nd maxillae ; *c*, wing ; *c'*, pustules on submarginal vein ; *d*, right half metanotum and propodeon ; *e*, abdominal spiracle ; *e'*, the same, on same scale as *d*.

sternum each with bristles 3-4 : 3-4. Propodeon (fig. 3, *d*) with four moderate bristles beyond the spiracle and one (occasionally two) minute near the posterior end of the spiracle on the inner (admedian) aspect. Metasternum intumescent on each side of the mid line, its surface raised in minute chitinous points.

Forewing (fig. 3, *c*, *c'*) just over 1 mm. in length, two and a quarter times as long as broad, bare on about the basal fourth.

Legs. Fore coxa (2 : 1) with a longitudinal row of about 24 long bristles, which form a fringe on inner aspect ; femur (17 : 8) about one-third longer than the coxa ; tibia over twice as long as broad and equalling in length the breadth of the femur, bearing at the apex antero-dorsally two teeth, with ventrally a short chitinous projection with one spinose bristle above ; both anteriorly and posteriorly the tibia bears a lateral row of about four short stiff bristles, and there are a few more along the



dorsal edge ; tarsus 2, 1, 1, 1, 3 ; the first joint bears one dorsal subapical bristle, one anterior, one ventral, and three (stouter) posteriorly ; joints 2-5 have bristles 1, 1, 2, 1, while five bears 1, 1, 0, 1. Mid coxa much widened posteriorly ; femur (10 : 3) shorter (6 : 7) than tibia (barely 6 : 1), which has about eight short stiff bristles along the dorsal edge and four ventrally on apical third. Tarsus as long as tibia, each joint with one subapical bristle dorsally and another apically and ventrally ; joints in ratio, 8, 7 : 7 : 5 : 9. Hind coxa (7 : 4) with 5-7 short heavy spinose bristles ; femur (2 : 1) one-seventh longer than the coxa ; tibia (3 : 1) three-fourths of the coxa in length ; tarsal joints in ratio 15 : 9 : 7 : 6 : 11.

Abdomen. The tergites from the second (fourth) onwards are deeply incised postero-medianly up to about one-half of their length. Between the spiracles is a broadish membranous area, and this tergite is produced anteriorly into a broad, angularly rounded median lobe. The stylet (8 : 5) bears four bristles—three apically and one at the side. The ovipositor sheath is slightly dilated apically, the ovipositor extending beyond the apex of the abdomen a distance of about 0.6 mm. The spiracle (fig. 3, *c*, *e*<sup>1</sup>, same scale as *d*) is oval, flattened on one side.

Length (excluding ovipositor) 1.4 mm. ; alar expanse, 2.4 mm.

*Type* ♀ in the British Museum, one of a small series of ♀ ♀ " From large tree with small figs in middle of Museum grounds."

BORNEO : Kuching, Sarawak, xi., 1907 (*J. Hewitt*).

*E. verticillata*, sp. n., is an isolated form which I have placed in this genus with some reluctance. It is easily recognised by its antennae, wings, protergum, etc. The material available for description is in a very broken condition, there being only two complete antennae and one wing in a score of specimens. Such dealation and loss of appendages are commonly incurred when the female enters the fig in which the eggs are to be laid.

The neurulation of the single wing preserved is peculiar and perhaps abnormal. There is a distinct marginal and postmarginal length, and in the membrane itself a disconnected pellucid thickening, suggesting an obsolescent radius. Particular attention is for this reason directed to fig. 3, *c*, which illustrates the points referred to.